EPA/OPP MICROBIOLOGY LABORATORY
ESC, Ft. Meade, MD

Standard Operating Procedure
for
Calibration and Maintenance of Weigh Balances

SOP Number: EQ-03-03

Date Revised: 09-27-05

Initiated By: _____Date: ___/___/___

Print Name:_____

Technical Review: _____ Date: ___/___/___

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Approved By: _____ Date: ___/___/___

Print Name:_____
Branch Chief

Effective Date: ___/___/___

Controlled Copy No.: _____

Withdrawn By: _____ Date: ___/___/___

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1.0 SCOPE AND APPLICATION:

1.1 This protocol describes the quality control requirements for weigh balances.

2.0 DEFINITIONS:

2.1 ASTM = American Society for Testing and Materials

2.2 ISO = International Organization for Standardization

2.3 NIST = National Institute of Standards and Technology

2.4 Degree of uncertainty for weigh balances = The uncertainty in measurement (in grams) that the laboratory can tolerate.

3.0 HEALTH AND SAFETY: Not applicable

4.0 CAUTIONS:

4.1 Certification of a weigh balance may only be performed by an ISO certified service.

4.2 NIST traceable reference weights (section 7.0) must be calibrated annually using a professional calibration service.

5.0 INTERFERENCES: None

6.0 PERSONNEL QUALIFICATIONS:

6.1 Personnel are required to be knowledgeable of the procedures in this SOP.

7.0 SPECIAL APPARATUS AND MATERIALS:

7.1 Mettler Model BB 120 (Serial Number N17581): Weighs 0 to 120 g, reads to 0.01 g, reproducibility 0.005 g (Manufacturer's claims). This balance is currently not in use in the laboratory. Quarterly accuracy checks and annual certification are not being performed.

7.2 Sartorius Basic Plus Model BP 211D (Serial Number 80904707): Weighs 0 to 40 / 80 / 210 g, reads to 0.00001 g or 0.01 mg, reproducibility $\leq$ 0.02 / 0.05 / 0.1 mg (Manufacturer's Claims).

7.3 Sartorius Master^{Pro} Series Model LP 420 (Serial Number 81107148): Weighs 0 to 420 g, reads to 0.01 g or 10 mg, reproducibility $\leq$ 0.01 g (Manufacturer's Claims).

7.4 Mettler Toledo Model PG5002-S (Serial Number 1120113248): Weighs 0 to 5100 g, reads to 0.01 g or 10 mg, reproducibility 0.008 g (Manufacturer's claims). This balance is the property of the Analytical Chemistry Branch and is stored in room C204. It is used by the OPP Microbiology Laboratory to measure the weight of a disinfectant container prior to sample removal and post-sample removal. The Analytical Chemistry Branch has a service agreement with a professional calibration vendor to check and calibrate the balance on an annual basis.

7.5 Troemner Reference Weight Set (ASTM Class 1) NIST Traceable: contains 1, 2, 5, 10, 20 and 50 g reference weights (Serial Number 16181).

7.6 Troemner Reference Weight (ASTM Class 1) NIST Traceable: 100 g (Serial Number 29511).

7.7 Troemner Reference Weight (ASTM Class 1) NIST Traceable: 100 mg (Serial Number 29510).

7.8 Troemner Reference Weight (ASTM Class 1) NIST Traceable: 10 mg (Serial Number 29509).

7.9 Troemner Reference Weight (ASTM Class 1) NIST Traceable: 1 mg (Serial Number 29508).

7.10 Troemner Reference Weight (ASTM Class 1) NIST Traceable: 500g (Serial Number 20443).

7.11 Troemner Reference Weight (ASTM Class 1) NIST Traceable: 1 kg (Serial Number 1).

7.12 Troemner Reference Weight (ASTM Class 1) NIST Traceable: 2 kg (Serial Number 1).

7.13 Troemner Reference Weight (ASTM Class 1) NIST Traceable: 2 kg (Serial Number 2).

8.0 INSTRUMENT OR METHOD CALIBRATION:

8.1 Each balance has a built-in calibration system which is activated by pressing "Cal". The weights are applied internally and are removed after calibration (see ref. 15.1, 15.2, and 15.3).

9.0 SAMPLE HANDLING AND STORAGE: Not applicable

10.0 PROCEDURE AND ANALYSIS:

10.1 Each balance will be cleaned after each use with a soft brush, if necessary; the balance pans will be cleaned of any debris with a damp towel after each use. Allow the balance to dry before next use.

10.2 If the Mettler Model BB 120 (section 7.1) is returned to service, the balance must be calibrated by a professional calibration service (if annual calibration has expired) and be checked quarterly for accuracy using NIST traceable reference weights (section 7.0). Nine weights ranging from 10 mg to 100 g (10 mg, 100 mg, 1 g, 2 g, 5 g, 10 g, 20 g, 50 g, and 100 g) will be used to check the instrument. The results are recorded on the Verification of Weigh Balance Calibration Record Form (see 16.0).

10.3 The Sartorius Model BP211D (section 7.2) balance is checked quarterly for accuracy using NIST traceable reference weights (section 7.0). Ten weights ranging from 1 mg to 100 g (1 mg, 10 mg, 100 mg, 1 g, 2 g, 5 g, 10 g, 20 g, 50 g, and 100 g) will be used to check the instrument. The results are recorded on the Verification of Weigh Balance Calibration Record Form (see 16.0).

10.4 The Sartorius Model LP 420 (section 7.3) balance is checked quarterly for accuracy using NIST traceable reference weights (section 7.0). Eleven weights ranging from 10 mg to 200 g (10 mg, 100 mg, 1 g, 2 g, 5 g, 10 g, 20 g, 50 g, 100 g, 150 g, and 200 g) will be used to check the instrument. The results are recorded on the Verification of Weigh Balance Calibration Record Form (see 16.0).

10.5 The Mettler Toledo PG5002-S balance (section 7.4) is checked quarterly for accuracy using NIST traceable reference weights (section 7.0). Seven weights ranging from 100 g to 5 kg (100 g, 500 g, 1 kg, 2 kg, 3 kg, 4 kg, and 5 kg) will be used to check the instrument. The results are recorded on the Verification of Weigh Balance Calibration Record Form (see 16.0).

10.6 The calibration of weigh balances is checked quarterly. The acceptable degree of uncertainty for weigh balances measuring weights of greater than 500 grams is $\pm$ 0.5 gram. The acceptable degree of uncertainty for weigh balances measuring weights of 100 to 500 grams is $\pm$ 0.1 gram. The acceptable degree of uncertainty for weigh balances measuring weights less than 100 grams is $\pm$ 0.01 gram.

10.7 Balances are inspected, cleaned, and calibrated annually by a professional calibration service.

11.0 DATA ANALYSIS/CALCULATIONS: None

12.0 DATA MANAGEMENT/RECORDS MANAGEMENT:

12.1 Data will be recorded promptly, legibly and in indelible ink on the Verification of Weigh Balance Calibration Record Form (see 16.0). Completed forms and the Annual Weight Calibration Certificates for NIST-traceable reference weights (Section 7.0) are archived in notebooks kept in secured file cabinets in the file room D217. Only authorized personnel have access to the secured files. Archived data is subject to OPP's official retention schedule contained in SOP ADM-03, Records and Archives.

13.0 QUALITY CONTROL:

13.1 For quality control purposes, the required information is documented on the appropriate form(s) (see 16.0).

14.0 NONCONFORMANCE AND CORRECTIVE ACTION:

14.1 Any discrepancies in weight measurements will be confirmed by repeating the operation. A service representative will be notified if necessary, to re-calibrate the instrument when the calibrations check shows that the degree of uncertainty for a weigh balance is outside of the acceptable range (see section 10.6).

15.0 REFERENCES:

15.1 Operating Instructions Manual for Mettler Balance

15.2 Operating Instructions Manual for Sartorius BP211D Balance

15.3 Operating Instructions Manual for Sartorius LP 420 Balance

15.4 Operating Instructions Manual for Mettler Toledo Model PG-5 Balance

16.0 FORMS AND DATA SHEETS:

16.1 Verification of Weigh Balance Calibration Record Form.

Verification of Weigh Balance Calibration Record
OPP Microbiology Laboratory

Balance ID_______________________
Standard Weights ID________________________

Date	Initials	Weights											Maintenance/Cleaning